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Test report of

## IES LM-79-08

Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Rendered to:

Imminent Teknologies Limited

Suite 5, Valley Towers, Valley Road, Birkirkara BKR9022, Malta

For products:

LED MODULE

Models No.:

BLU-MOD-8W-827-38

**Test Date:** Apr. 1, 2023

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**Template No.:** LC-RT-PL-001 Rev.2.0

**Test Note:** N/A

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Apr. 7, 2023

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Apr. 7, 2023

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## 1. General

### 1.1 Product Information

|                              |                         |
|------------------------------|-------------------------|
| Brand Name                   | BLUi Lighting           |
| Product Type                 | LED MODULE              |
| Model Number                 | BLU-MOD-8W-827-38       |
| Rated Inputs                 | 36VDC                   |
| Rated Power                  | 8W                      |
| Rated Light output           | 755lm                   |
| Declared CCT                 | 2700K                   |
| Power Supply                 | Integrated in luminaire |
| LED Package, Array or Module | CREE                    |
| Receipt Samples              | 1 unit                  |
| Sample Code of lab.          | 230331104002            |
| Date of Receipt Samples      | Mar. 31, 2023           |
| Note                         | -                       |



**1.2 Standards or methods**

The following standards are partly or totally used or referenced for test:

| No.                               | Name   |
|-----------------------------------|--|
| ANSI/NEMA/ ANSLG<br>C78.377- 2017 | Specifications for the Chromaticity of Solid State Lighting Products               |
| ANSI C82.77-2002                  | Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment |
| CIE Pub. No. 13.3-1995            | Method of Measuring and Specifying Color Rendering of Light Sources                |
| CIE Pub. No. 15:2004              | Colorimetry  |
| IES LM-79-08                      | Electrical and Photometric Measurements of Solid-State Lighting Products           |

**1.3 Equipment list**

| Instrument  | ID          | Model name  | Cal. date  | Next cal. Date |
|---|-------------|-------------|------------|----------------|
| DC Power supply                                       | LC-I-947    | IT6512      | 2022-12-13 | 2023-12-12     |
| Power analyzer  | LC-I-PL-024 | WT310E      | 2023-03-07 | 2024-03-06     |
| Power analyzer  | LC-I-954    | WT210       | 2022-12-13 | 2023-12-12     |
| Multimeter  | LC-I-972    | Fluke       | 2022-07-01 | 2023-06-30     |
| Photometric colorimetric electric system <sup>1</sup> | LC-I-956    | HAAS-2000   | Before use | Before use     |
| Standard lamp <sup>2</sup>                            | LC-I-963    | 24V50W      | 2022-07-12 | 2023-07-11     |
| Luminous flux lamp <sup>3</sup>                       | LC-I-PL-031 | AC220V/200W | 2022-07-21 | 2023-07-20     |
| Goniophotometer(with mirror)                          | LC-I-902    | GMS2000     | 2022-04-21 | 2023-04-20     |
| Wireless temperature transmitter                      | LC-I-PL-009 | DWLR-DLR    | 2022-12-15 | 2023-12-14     |
| Wireless temperature transmitter                      | LC-I-PL-008 | DWLR-DLR    | 2022-12-15 | 2023-12-14     |

Note:

1, Bandwidth of spectroradiometer is 1 nm.

2, Halogen lamp, 50W, omni-directional type, and its traceability to NIM.

3, Incandescent lamp, 200W, omni-directional type, and its traceability to NIM.

## 2. Test conducted and method

The luminaire was operated at least 2 hours to reach stabilization and temperature equilibrium before test.

### 2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ ; the air flow around the sample(s) being tested did not affect the performance.

### 2.2 Power Supply Characteristics

The voltage of DC power supply (instantaneous voltage) applied to the device under test was regulated to within  $\pm 0.2$  percent under load.

### 2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

### 2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for DC voltage and current were less than 0.1 percent.

### 2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

### 2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

### 2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

### 2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.



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### 3. Test Result Summary

#### 3.1 Electrical data

| Criteria Item             | Result(Sphere) | Result(Goniophotometer) |
|---------------------------|----------------|-------------------------|
| Input Voltage & Frequency | 35.99 V        | 36.00 V                 |
| Input Current(A)          | 0.223          | 0.223                   |
| Total Power(W)            | 8.04           | 7.59                    |
| Power Factor              | 1.000          | 1.000                   |
| I-THD                     | -              | -                       |
| Off-state Power(W)        | -              | -                       |

#### 3.2 Photometric data

| Criteria Item                         | Result(Sphere)          | Result(Goniophotometer)       |
|---------------------------------------|-------------------------|-------------------------------|
| Total Lumens(lm)                      | -                       | 810.76                        |
| Luminaire Efficacy(Lm/W)              | -                       | 106.82                        |
| Correlated Color Temperature (CCT)(K) | 2707                    | -                             |
| Color Rendering Index (CRI)           | 83.4                    | -                             |
| R9                                    | 11                      | -                             |
| Chromaticity Coordinate (x,y)         | x = 0.4599 y = 0.4116   | -                             |
| Chromaticity Coordinate (u,v)         | u = 0.2621 v = 0.3485   | -                             |
| Chromaticity Coordinate (u',v')       | u' = 0.2621 v' = 0.5277 | -                             |
| Duv                                   | 0.0004                  | -                             |
| Zone Lumens between 0-60 °            | -                       | 99.05%                        |
| Beam Angle(50%Imax)                   | -                       | C0/180=39.1°<br>C90/270=40.0° |

#### 3.3 Color Rendering Details

|    |     |     |     |     |     |     |    |
|----|-----|-----|-----|-----|-----|-----|----|
| R1 | R2  | R3  | R4  | R5  | R6  | R7  | R8 |
| 82 | 91  | 97  | 82  | 82  | 91  | 83  | 59 |
| R9 | R10 | R11 | R12 | R13 | R14 | R15 | -  |
| 11 | 81  | 82  | 77  | 84  | 99  | 74  | -  |

Note: N/A

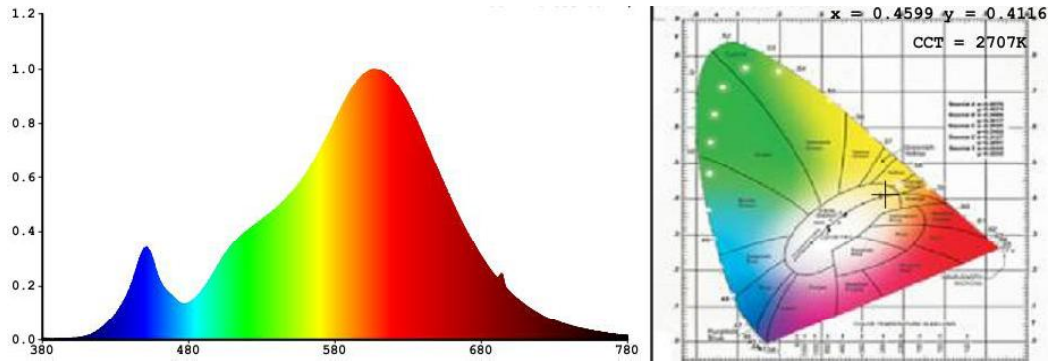


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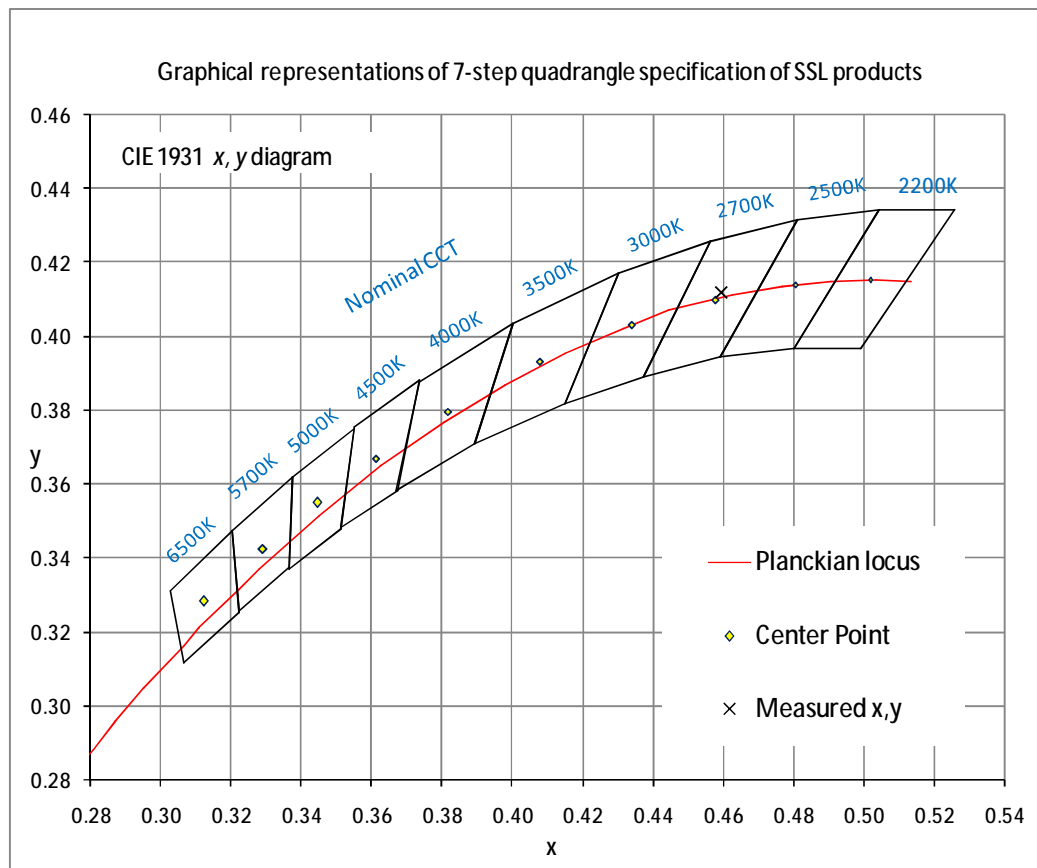


## 4. Test Data

### 4.1 Spectral Distribution



### 4.2 ANSI Chromaticity Quadrangles Diagram





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**4.3 Goniometry Test Data**

|                             |         |                      |                   |
|-----------------------------|---------|----------------------|-------------------|
| CIE Type                    | Direct  | Basic Luminous Shape | Circular          |
| Spacing Criteria (0-180)    | 0.66    | Luminous Length      | 0.04 m (Diameter) |
| Spacing Criteria (90-270)   | 0.66    | Luminous Width       | 0.04 m (Diameter) |
| Spacing Criteria (Diagonal) | 0.62    | Luminous Height      | 0.00 m            |
| Test Distance               | 30.00 m |                      |                   |

**4.4 Zonal Lumen Summary**

| Zone    | Lumens  | %Lamp | %Fixt |
|---------|---------|-------|-------|
| 0-20    | 620.45  | 61.20 | 61.20 |
| 0-30    | 891.71  | 87.90 | 87.90 |
| 0-40    | 959.01  | 94.50 | 94.50 |
| 0-60    | 1000.41 | 98.60 | 98.60 |
| 0-80    | 1012.41 | 99.80 | 99.80 |
| 0-90    | 1013.04 | 99.90 | 99.90 |
| 10-90   | 817.96  | 80.60 | 80.60 |
| 20-40   | 338.56  | 33.40 | 33.40 |
| 20-50   | 364.78  | 36.00 | 36.00 |
| 40-70   | 49.72   | 4.90  | 4.90  |
| 60-80   | 11.99   | 1.20  | 1.20  |
| 70-80   | 3.68    | 0.40  | 0.40  |
| 80-90   | 0.64    | 0.10  | 0.10  |
| 90-110  | 0.00    | 0.00  | 0.00  |
| 90-120  | 0.00    | 0.00  | 0.00  |
| 90-130  | 0.00    | 0.00  | 0.00  |
| 90-150  | 0.11    | 0.00  | 0.00  |
| 90-180  | 1.46    | 0.10  | 0.10  |
| 110-180 | 1.46    | 0.10  | 0.10  |

Total Luminaire Efficiency = 100.00%

**ZONAL LUMEN SUMMARY**

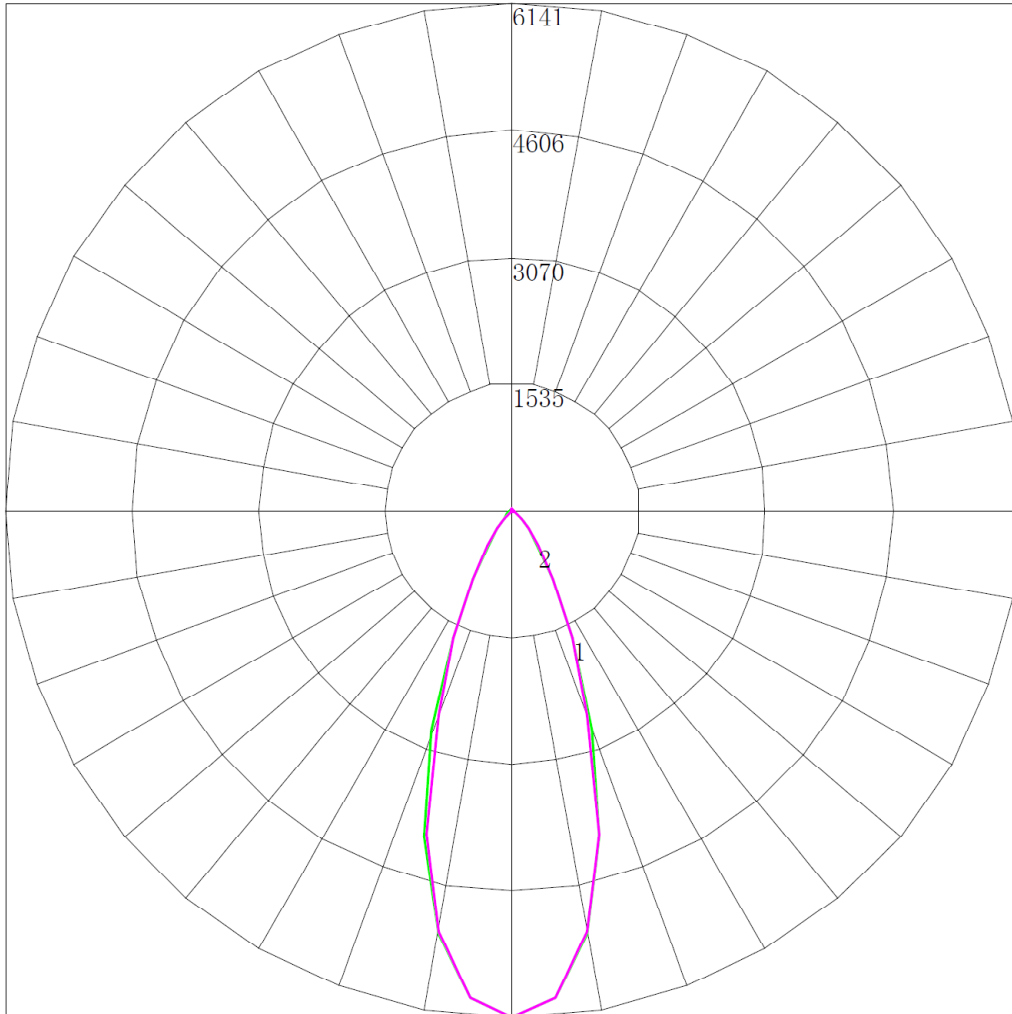
| Zone    | Lumens |
|---------|--------|
| 0-10    | 195.08 |
| 10-20   | 425.37 |
| 20-30   | 271.26 |
| 30-40   | 67.30  |
| 40-50   | 26.23  |
| 50-60   | 15.18  |
| 60-70   | 8.31   |
| 70-80   | 3.68   |
| 80-90   | 0.64   |
| 90-100  | 0.00   |
| 100-110 | 0.00   |
| 110-120 | 0.00   |
| 120-130 | 0.00   |
| 130-140 | 0.00   |
| 140-150 | 0.11   |
| 150-160 | 0.44   |
| 160-170 | 0.63   |
| 170-180 | 0.28   |





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4.5 Polar Curves



Maximum Candela = 6140.774 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)



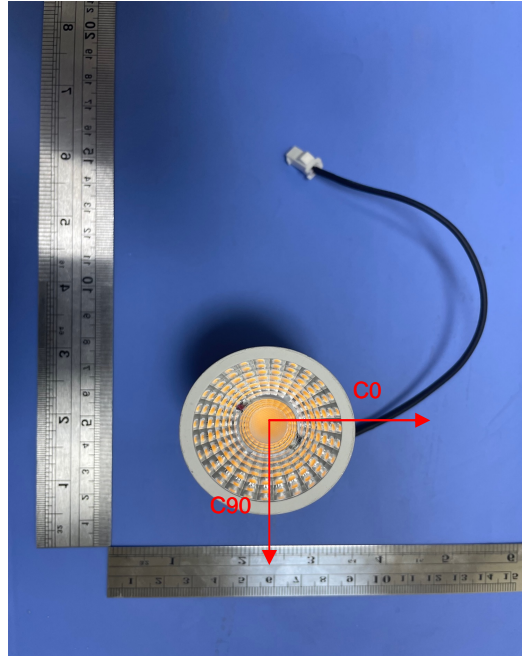
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4.6 Candela Tabulation

|            | <u>0</u> | <u>15</u> | <u>30</u> | <u>45</u> | <u>60</u> | <u>75</u> | <u>90</u> |
|------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>0</b>   | 2168.839 | 2168.839  | 2168.839  | 2168.839  | 2168.839  | 2168.839  | 2168.839  |
| <b>5</b>   | 2103.971 | 2100.702  | 2112.115  | 2115.536  | 2112.521  | 2113.627  | 2082.743  |
| <b>10</b>  | 1906.234 | 1911.922  | 1931.788  | 1927.710  | 1920.357  | 1921.209  | 1859.862  |
| <b>15</b>  | 1580.193 | 1571.939  | 1588.249  | 1582.102  | 1573.242  | 1577.886  | 1551.634  |
| <b>20</b>  | 1082.183 | 1085.266  | 1082.596  | 1065.142  | 1059.211  | 1072.771  | 1039.531  |
| <b>25</b>  | 622.110  | 608.537   | 591.107   | 561.138   | 539.635   | 535.230   | 520.215   |
| <b>30</b>  | 241.042  | 236.254   | 225.934   | 216.136   | 206.134   | 199.585   | 201.134   |
| <b>35</b>  | 95.424   | 92.871    | 90.252    | 85.255    | 82.603    | 80.941    | 80.852    |
| <b>40</b>  | 49.747   | 49.641    | 49.302    | 47.686    | 47.306    | 47.154    | 46.463    |
| <b>45</b>  | 32.658   | 32.751    | 32.801    | 32.323    | 32.753    | 32.672    | 32.058    |
| <b>50</b>  | 23.129   | 22.989    | 23.098    | 23.033    | 23.225    | 23.305    | 23.111    |
| <b>55</b>  | 16.553   | 16.555    | 16.569    | 16.600    | 16.624    | 16.630    | 16.436    |
| <b>60</b>  | 11.676   | 11.751    | 11.729    | 11.786    | 11.691    | 11.879    | 11.669    |
| <b>65</b>  | 8.187    | 8.132     | 8.172     | 8.187     | 8.199     | 8.236     | 8.176     |
| <b>70</b>  | 5.503    | 5.473     | 5.516     | 5.533     | 5.541     | 5.498     | 5.450     |
| <b>75</b>  | 3.355    | 3.373     | 3.377     | 3.352     | 3.424     | 3.371     | 3.453     |
| <b>80</b>  | 1.655    | 1.676     | 1.711     | 1.664     | 1.734     | 1.651     | 1.637     |
| <b>85</b>  | 0.358    | 0.402     | 0.338     | 0.337     | 0.293     | 0.294     | 0.275     |
| <b>90</b>  | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>95</b>  | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>100</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>105</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>110</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>115</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>120</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>125</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>130</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>135</b> | 0.000    | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>140</b> | 0.000    | 0.045     | 0.000     | 0.000     | 0.000     | 0.000     | 0.000     |
| <b>145</b> | 0.179    | 0.223     | 0.180     | 0.180     | 0.135     | 0.135     | 0.068     |
| <b>150</b> | 0.403    | 0.402     | 0.383     | 0.405     | 0.360     | 0.340     | 0.364     |
| <b>155</b> | 0.984    | 0.938     | 0.968     | 0.945     | 0.924     | 0.950     | 0.955     |
| <b>160</b> | 1.655    | 1.653     | 1.688     | 1.665     | 1.667     | 1.629     | 1.591     |
| <b>165</b> | 2.326    | 2.346     | 2.386     | 2.362     | 2.365     | 2.376     | 2.226     |
| <b>170</b> | 2.774    | 2.793     | 2.814     | 2.812     | 2.748     | 2.783     | 2.724     |
| <b>175</b> | 2.953    | 2.971     | 3.017     | 2.947     | 2.996     | 3.009     | 2.905     |
| <b>180</b> | 3.157    | 3.157     | 3.157     | 3.157     | 3.157     | 3.157     | 3.157     |

## Appendix A Product Photo



Picture 1



Picture 2

\*\*\*\*End of test report\*\*\*\*